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### A

**Angelantoni, Gianluigi,** Environmental Simulation of Safe Preservation of Wet Mummies, V. 43, No. 3, p. 27. *Archeological finds can be impressive when discovered but the question is how to preserve them for the future. Particularly in the case of organic material, such as human bodies, the technical issues relevant to the preservation environment are critical. In addition, the design requirements are often opposed to physical laws. One of the most important discoveries in this area was the 5500-yr-old mummy, known as "Ötzi," the man from the ice, that was found in the Similaun glacier. The peculiarity of this mummy is that it is "wet" and not "dry" like the Egyptian mummies. To preserve this mummy, a special thermal safe had to be designed. This paper describes the technical solutions that were devised to create a cleanroom with the proper climatic conditions of a -6°C temperature with nearly 100% relative humidity; to ensure proper lighting to avoid dangerous radiation; to provide an accurate measurement and control system including the color and weight of the mummy; and to provide the maximum reliability of the system by a redundant and failsafe configuration to avoid any possible damage to the mummy.* (DTE: Climatics and Thermal)

### C

**Carlberg, Jon,** Evaluation of an In-Situ Particle Monitoring System on an MxP Plasma Etch Tool, V. 43, No. 1, p. 21. *Etching is the process where a layer is removed from a wafer surface through openings in a photoresist pattern. This article describes how a surface scan was used to monitor this process. An in-situ particle monitor (ISPM) was installed on a plasma etch tool. The ISPM was incorporated so engineers and technicians could gain real-time information and notification of what was happening inside this tool during processing. Since ISPMs are real-time, they can catch problems as they are occurring. The ISPM detected two major problems on the plasma etch tool within a 3-wk period. The wafer scan data were monitored during this same time frame.* (CC: Cleanroom Operation/Procedures; Identification, Measurement, and Monitoring)

**Caruso, Hank,** Environmental Stress Screening vs. Product Life Consumption, V. 43, No. 3, p. 41. *The question of how much product life environmental stress screening (ESS) will consume is neither simple nor straightforward. Adopting simplistic rules of thumb invokes the assumption that all products are the same and homogeneous. This paper discusses the issues involved with assessing the potential impact a particular ESS regimen has on a product's useful life: a) How do we define product life?; b) What environmental loads are applied during ESS?; and c) How will the product be affected and to what degree? Several options for dealing with product life consumed during ESS are discussed.* (DTE: Test Tailoring; PR: Reliability Achievement, Stress Screening)

**Connon, William H., III,** Determining Vehicle Sensitivity to Changes in Test-Course Roughness, V. 43, No. 4, p. 32. *Test courses are monitored at the U.S. Army Aberdeen Test Center (ATC) on a monthly basis and are altered as required to maintain a "constant" roughness. The monitoring process consists of a jury ride and analysis of data acquired using an instrumented light wheeled vehicle. The surface profiles of test courses at ATC are also measured on a monthly basis using a profilometer which makes a series of displacement and angular measurements that are used to compute surface roughness as a function of distance traveled over the test course. This paper proposes two techniques for determining vehicle sensitivity to changes in test-course roughness (vehicle-dependent ride quality and vehicle-independent fatigue damage spectrum) and, thus, the requirement to maintain the course. Both of these techniques require a data transformation in the spatial domain analogous to the power spectral density function in the temporal domain. An example using data measured before and after grading of an actual test course is presented.* (DTE: Automotive/Transportation, Criteria and Standards, Shock and Vibration)

**Cooper, Douglas W.,** Characteristics of Wipers and Swabs for Pharmaceutical Applications, V. 43, No. 1, p. 31. (Abstract—see Miscioscio, Kathy)

**Cooper, Douglas W.,** Evaluation of the Effects of Flow Rate Reduction on the Environmental Parameters of an Operational Cleanroom, V. 43, No. 4, p. 40. (Abstract—see Jue, Michael)

F

**Fillipovic, Anton,** Evaluation of the Effects of Flow Rate Reduction on the Environmental Parameters of an Operational Cleanroom, V. 43, No. 4, p. 40. (Abstract—see Jue, Michael)

**Foarde, Karin K.,** Measurement and Detection of Cleanroom Fabric Barrier and Shedding Properties, V. 43, No. 2, p. 28. *This paper describes a series of standard and novel tests used to quantify cleanroom fabric barrier and shedding properties. The three tests are: a microbial penetration test, and the IEST-RP-CC003.2 particle penetration and Helmke drum tests. When used together, the combined results provide a comprehensive evaluation of the fabrics and garments.* (CC: Filters and Filtration; Identification, Measurement, and Monitoring)

G

**Grant, Donald C.,** Optimization of Filter Properties for Recirculating Etch Baths, V. 43, No. 3, p. 30. (Abstract—see Kelly, Wayne P.)

H

**Hanley, James T.,** Measurement and Detection of Cleanroom Fabric Barrier and Shedding Properties, V. 43, No. 2, p. 28. (Abstract—see Foarde, Karin K.)

**Hess, Don,** Evaluation of an In-Situ Particle Monitoring System on an MxP Plasma Etch Tool, V. 43, No. 1, p. 21. (Abstract—see Carlberg, Jon)

**Hill, Liz A.,** Measurement and Detection of Cleanroom Fabric Barrier and Shedding Properties, V. 43, No. 2, p. 28. (Abstract—see Foarde, Karin K.)

**Huang, Tom,** Evaluation of the Effects of Flow Rate Reduction on the Environmental Parameters of an Operational Cleanroom, V. 43, No. 4, p. 40. (Abstract—see Jue, Michael)

**Hundt, Andreas,** Evaluation of the Effects of Flow Rate Reduction on the Environmental Parameters of an Operational Cleanroom, V. 43, No. 4, p. 40. (Abstract—see Jue, Michael)

J

**Jue, Michael,** Evaluation of the Effects of Flow Rate Reduction on the Environmental Parameters of an Operational Cleanroom, V. 43, No. 4, p. 40. *This report provides results of measurements made to characterize the effects of lowering the HEPA filter air velocity in an operational semiconductor facility. Reduction of HEPA filter velocity can reduce energy consumption by lowering the power consumption of recirculation fans. Data were collected for the cleanroom base HEPA velocity condition. The same data set was collected for conditions of reduced HEPA filter air velocity. Comparison of the data distinguishes changes between different operational air velocities. There is significant variation in the measured values for HEPA filter velocity attributed to technique and facility parameters. When air velocity is reduced below an optimum value, airborne particle counts and variation in the counts increase. Lowered air velocity also affects total adsorbed vapors, the drain rate of charged wafers, and electrical power consumption of recirculation air handlers. For other measured parameters, a difference can be observed but the practical effect on the product can be considered negligible.* (CC: Cleanroom Operation/Procedures; Filters and Filtration; Identification, Measurement, and Monitoring)

K

**Kaufman, Daniel S.,** Force-Limiting Testing for the Small Explorer Satellite Program at NASA Goddard Space Flight Center, V. 43, No. 1, p. 24. *The Wide Field Infrared Explorer (WIRE) and Transition Region Coronal Explorer (TRACE) Spacecraft underwent random vibration testing using force-limiting techniques as a means of controlling the vibration input motions. Interface force measurements were made for random vibration tests. Automatic force feedback notching was provided for the random vibration tests. This paper presents the methods used to determine force spectra. Test results are presented to show the effects of the force-limiting technique.* (DTE: Shock and Vibration, Test Tailoring)

**Kelly, Wayne P.,** Optimization of Filter Properties for Recirculating Etch Baths, V. 43, No. 3. p. 30. *Membrane filters are often used to remove small particles from liquids in recirculating etch baths (REBs). The ideal filter for this application would have both high particle capture efficiency and high flow permeability. Unfortunately, filters with high particle capture efficiency often have low permeability because the dominant particle capture mechanism is mechanical sieving. This paper describes more efficient capture mechanisms, interception and diffusion, and a filter with a surface modified to capture particles by these mechanisms. The filter has the same permeability as a conventional 0.45-μm filter and retains particles more efficiently than a conventional 0.05-μm filter. The filter is capable of removing multiple types of small (0.065-μm) particles (polystyrene latex, silicon nitride, alumina, etc.) with high efficiency (> 99.9 percent).* (CC: Filters and Filtration)

M

**Miscioscio, Kathy,** Characteristics of Wipers and Swabs for Pharmaceutical Applications, V. 43, No. 1, p. 31. *The manufacture of pharmaceuticals requires clean processing. Wipers are used to remove contaminants, such as chemical films, microbiological entities, and nonbiological particles, by wiping the walls, tables, and equipment and to inhibit biological activity by applying disinfectants. Cleaning protocols can be validated using clean swabs for sampling and sensitive instrumentation for quantification. The characteristics of wipers and swabs suitable for these purposes are explored.* (CC: Cleanroom Design/Materials, Cleanroom Operation/Procedures)

R

**Raymond, Mike,** Accelerated Test Techniques, V. 43, No. 2, p. 21. *Currently there is considerable debate over the*

*relevance and adequacy of emerging vibration test methodologies. This paper details a controlled series of experiments designed to evaluate the nature and consistency of failures produced from several test methodologies including single-axis step stress, skewed-fixture step stress, pneumatic impact, and finite element analysis. Details regarding the test article, individual test methods, and a summary of conclusions are presented.* (DTE: Shock and Vibration, Test Time Compression; PR: Durability/Fatigue)

**Roybal, Robert,** Simulated Space Debris Impact Experiments on Toughened Laminated Thin Solar Cell Cover Glass, V. 43, No. 2, p. 32. *Increasing demands on the design criteria of spacecraft components have driven efforts to develop advanced space debris ground simulation techniques suitable to be incorporated into a space environmental effects chamber. A laser-driven flyer method suitable in such a chamber was used to conduct an initial investigation of space debris impact on a new toughened solar cell cover glass material. Damage characteristics, including mechanical damage and contamination generated by impact with a 3-mm diameter, 3-μm thick aluminum particle accelerated to 4.5 km/sec, were investigated. Scanning electron microscopy, optical microscopy, and spectrophotometry were used to measure the mechanical damage and the loss of solar transmission. Because of the limited number of impact tests made in this initial study, a quantitative analysis was not possible. However, much insight was obtained from the observed damage.* (CC: Sources and Effects; DTE: Shock and Vibration)

**S**

**Stein, Charles,** Simulated Space Debris Impact Experiments on Toughened Laminated Thin Solar Cell Cover Glass, V. 43, No. 2, p. 32. (Abstract—see Roybal, Robert)

**Stokes, P.H.,** Simulated Space Debris Impact Experiments on Toughened Laminated Thin Solar Cell Cover Glass, V. 43, No. 2, p. 32. (Abstract—see Roybal, Robert)

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**Tlomak, Pawel,** Simulated Space Debris Impact Experiments on Toughened Laminated Thin Solar Cell Cover Glass, V. 43, No. 2, p. 32. (Abstract—see Roybal, Robert)

**W**

**Wang, Richard D.,** Evaluation of the Effects of Flow Rate Reduction on the Environmental Parameters of an Operational Cleanroom, V. 43, No. 4, p. 40. (Abstract—see Jue, Michael)

**Welker, Roger W.,** Size Distribution of Particles Extracted from Different Materials Compared with the MIL-STD-1246 Particle Size Distribution, V. 43, No. 4, p. 27. *MIL-STD-1246 particle size distribution is the basis for specifying the particle cleanliness of surfaces for many governmental and industrial applications. MIL-STD-1246 states that naturally occurring particle contamination on surfaces follows a lognormal particle size distribution, with a geometric mean of 1 μm, following a very precise size specification. However, the naturally occurring particle size distribution may be a function of the material under examination and/or the prior cleaning or surface treatment history of the material. This paper explores the relation between the MIL-STD-1246 particle size distribution and particle size distributions measured after extraction followed by liquidborne particle size distribution analysis.* (CC: Criteria and Standards; Identification, Measurement, and Monitoring)

**Z**

**Zahka, Joseph,** Optimization of Filter Properties for Recirculating Etch Baths, V. 43, No. 3, p. 30. (Abstract—see Kelly, Wayne P.)


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